Civil and Mechanical Engineering.

PATENT INVENTION.

By J. Richards, M. E.

When any public interest becomes the subject of controversy, when widely different opinions are drawn from apparently the same premises, it is generally safe to assume that there is some inherent error that lies at the bottom—some principle that is at variance with the laws of political economy, or of science, as the case may be. With this proposition I beg briefly to consider the subject of patent inventions, in view of the present agitation of the matter in England and the United States.

Our courts have for two centuries puzzled their brains to define what constitutes invention—where devices or combinations end, and where principles begin; to define what principle means, as applied to machines, &c., &c.

Our legislators have grappled this knotty subject of property in invention (as is plainly their duty); long harangues are the result. A commission costing thousands of pounds has, in England, been set at work to unravel this troubled question of patents.

The history of the Netherlands, with their mechanical achievements of two centuries ago, are dragged into the argument; men skilled in procuring patents are placed at the bar to give testimony as to the patent system. (The writer must, however, be careful in reviewing this matter, as he has not mustered the courage to go through the proceedings of the commission.)

Now, Mr. Judge or Legislator, is it not possible that there is something behind all this trouble about patents that has been lost sight of, and are you not trying to frame *civil* laws to govern that which belongs to the field of *science?* Has not the demonstration of the mechanical equivalent of heat, the laws of forces, laws of construction, &c., under the rapid advances of the few last years, "undermined" your old theories about property in invention?

Assuming the proposition given at the outset to be true, the writer as an engineer and patentee of numerous inventions, begs to submit the following views in regard to patents, which, so far as he knows, have not been embodied in any of the very able discussions heretofore had on this subject, trusting that, whether true or erroneous, they

will contribute something to the settlement of a question in which he feels a great interest.

To present his views in a manner intelligible to all, the following propositions are submitted:

First. Invention, in accordance with the general acceptation of the term, means "discovery," a finding out of something not known before, not by consecutive deductions from certain known premises, but a kind of "accidental" discovery. It might also be said to mean a kind of "intuition" that reveals what is sought through a faculty called genius.

Second. Demonstration by deductions from known premises or data, wrought out by mathematical or engineering knowledge, is not invention in the sense above, nor can it be comprehended in the intent of the law relating to discoveries or inventions.

Third. The necessity for, or even the very existence of such a thing as invention or discovery, in the popular sense, is found wholly in our imperfect knowledge of scientific law, and the age in which it was found to be expedient or necessary to offer *bribes* for such discovery has passed away.

In reference to the first proposition, it is hardly worth while to offer anything in its support, that inventions means in a popular way a kind of "chance finding out" none will dispute. It has ever been regarded as a kind of supernatural gift. Inventions have had thrown around them the cloak of secrecy, and the public mind has always been educated to a kind of mystery in regard to patents.

Think of a State offering premiums to its subjects for the discovery (not demonstration) of a "perpetual motion," whatever that may be. Think of the thousands of pounds and the hundreds of useless lives that have been sacrificed on this altar of mechanical discovery, and we must go far back to the dark ages of alchemy and superstition to find a parallel.

The second proposition, as to what does not constitute invention, is more important. In its support no stronger argument can be adduced, nor even wanted, than the trouble that has ever existed to define what constitutes invention, such invention as could by right become the property of the individual. It has been held that such invention must not comprehend a principle; next, a principle must be defined, which we are told is a "mode of operation," and that the devices may be claimed but not their "manner of operating;" but then these devices we claim are, of necessity, mechanical agents, gen-

erally known both to practice and philosophy. Yes, true, but there is the combination of these elements that is proper subject-matter for a patent and exclusive right. Grant that, but it is further held that at least one element in a particular combination must be new; "new" in what sense? there is rarely a new mechanical movement discovered; new in the sense of not being known to the laws of physics, and there can be no new element among mechanical devices in these combinations.

We are also told that a combination of old elements to produce a new result is proper subject-matter for a patent, which, like the former assumption, if followed out ends at the same point, just where it began, and has no meaning that is sufficiently tangible for the mind to grasp. The inevitable conclusion is, there is *nothing* in invention which can of right become the property of the individual, for the want of our power to define it. If there is anything to which he has a natural right it could certainly be so defined as to come within the scope of ordinary comprehension.

Results attained, then, by deductive reasoning are not inventions—not discoveries at least in the accepted sense, for two persons with similar premises will attain like results in pursuit of a given object; the premises—laws—data—or whatever else we may term them, are open to all. The scientific or practical attainments of the inventor are but borrowed from popular sources, and the experience and knowledge of others, hence results or demonstrations, inventions if you please, thus wrought out cannot of right become the property of the individual, and cannot certainly be the intent and meaning of the statute relating to invention.

The third proposition is a bold one, no doubt, but nevertheless true in the abstract, so far as relating to mechanical invention, at least; every invention or discovery in mechanics must, of necessity, be found to conform to the laws of science. The difference, then, between what we will term "legitimate" and "illegitimate" invention, is that in the one case the result is discovered by tracing it out through the medium of these laws, as from cause to effect; in the other by groping about until, by chance, we light upon the result, and then by a negative course *follow back* these laws to prove its conformity with physical science; to make a plain illustration, it is like making a search for the missing end of a thread, in one case groping about to find it by accidental discovery, in the other by following the thread itself to the missing end.

To show by a more familiar example that this proposition is not a chimerical one, let us suppose that an existing fault or want has been demonstrated. This fault or want we will suppose, for example, to be the tendency of railway trains to overturn in making sharp curves. Let us next suppose two inventors, one of the illegitimate school, setting about to "discover" a remedy, without scientific knowledge, but with the incentive of "personal right" in his discovery when made; the other, an engineer educated in the laws of physical science and construction, moving in the legitimate performance of his professional duty.

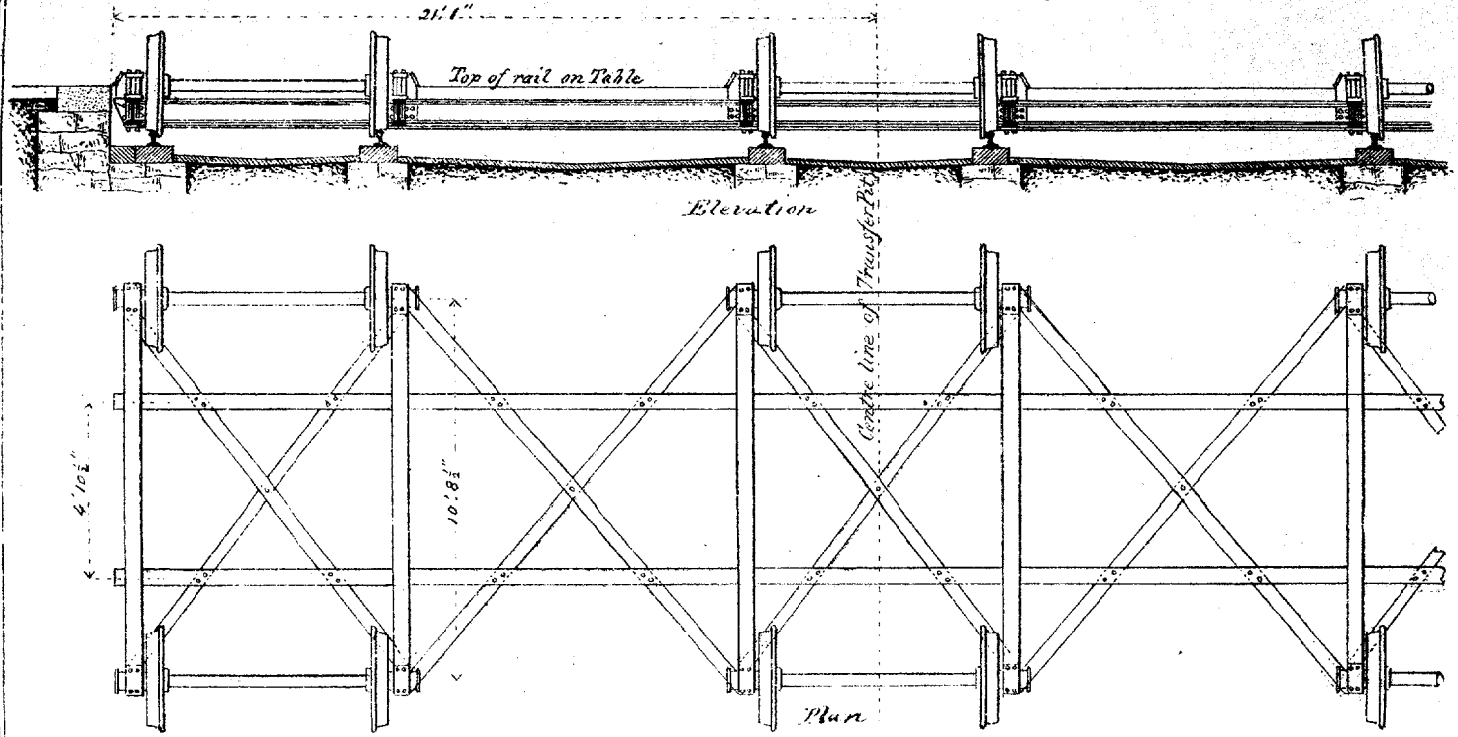
The first commences by tasking what is termed his "ingenuity" for expedients to keep the carriages on the track. Mechanical devices of various kinds present themselves to his mind; he thinks of gib hooks beneath the rail; he thinks of a shifting load to move to the short side of the curve, of a wider wheel base, of greater weight to keep the carriages down, of lowering the weight to get it between the rails; finally he hits upon an expedient which is *tried;* it fails, is modified, *tried again*, is abandoned for another, until, after expensive experiments, the true remedy may or may not be reached.

On the other hand, let us suppose the same matter to be taken in hand by the legitimate inventor, or "demonstrator" is the better term. He begins by ascertaining the conditions, finds a force acting which tends to overturn the train, a force with which he is familiar, as the tendency of moving bodies to remain in one plane, the extent, direction and influence of this force is all measured by laws which he knows to be fixed and constant.

The train being in motion, no stationary resistance can be opposed to this force, neither can it be destroyed nor its course changed; hence his teachings tell him it must be met and neutralized by a force acting in an opposite direction; this cannot be had, but acting at right angles is the force of gravity, which can be used; it is already acting, but insufficient in degree. To increase it he raises the outer rail until the centre of gravity has reached a position to balance the centrifugal force of the train, and has accomplished, without experiment, without discovery, all that can in the nature of things be possible to remedy the fault, and yet done nothing outside the regular exercise of his professional duties, certainly nothing to give him the right of property in the result.

It might be safely asserted that the loss of time and loss by experiment, to say nothing of the influence to retard legitimate engin-

Pennsylvania Railroad Shops, West Philadelphia, Transfer Table.



Construction Dept Penna. R. R.

eering, has, by this system of *bribes for discovery*, done more harm than good for ten years past.

It might also be assumed that we have now reached a period when the rights of the people, the dignity of legitimate engineering and public interest demands its discontinuance.

The impossibility of the proper administration of a system founded in error, is of itself no doubt a sufficient reason for its discontinuance, but we can now afford to place it upon higher grounds.

In conclusion, the writer desires to say that nothing is further from his intention than to cast any reflection upon the many highly important inventions that have come to us through the school of "discovery," nor is it the intent to declaim against a system that has had its place in the development of our arts, but simply to claim that its faults have not been traced to the proper source and that its time has passed away.

We no longer need the incentive of personal right in invention or demonstration to develop our arts, and the writer, from his own observation, both in England and America, finds that the better class of engineers and mechanicians have come already to look with disfavor upon patents, a question of fact which will be confirmed by as many as have noticed the matter, and one that can be determined by searching the records of the patent office for the names of our best engineers.

PENNSYLVANIA RAILROAD SHOPS AT WEST PHILADELPHIA.

By Joseph M. Wilson, C. E.

P. A. Engineer Construction Department Pennsylvania Railroad.

(Continued from Vol LXII. page 320.)

Transfer Pit and Table. The transfer pit is located between the locomotive shop and the passenger car shop, so that it may be used for shifting both locomotives and cars. It is 244 feet long and 42 feet 2 inches wide, inside dimensions. The side walls are of stone 2 feet thick, with a cut stone coping course on top, 18 inches wide and 9 inches deep, the rails of the tracks from the shops being cut into this coping, so that the top of coping is flush with top surface of rails. There are three tracks on the floor of the pit running in the direction of its length, to guide the movement of the transfer table. Each rail is laid upon a 6 by 12 inch white oak track stringer, having a foundation wall under it 20 inches thick, the track stringer being firmly fixed to the foundation by anchor bolts at frequent in-